# BMP: TREE PRESERVATION & PROTECTION

## Definition

Protection of desirable trees from mechanical and other injury during land disturbing and construction activity.

## Purpose

To ensure the survival of desirable trees where they will be effective for erosion and sediment control, watershed protection, landscape beautification, dust and pollution control, noise reduction, shade and other environmental benefits while the land is being converted from forest to urban-type uses.

## Conditions Where Practice Applies

Tree-inhabited areas subject to land disturbing activities.

## Planning Considerations

New development often takes place on tracts of forested land. In fact, building sites are often selected because of the presence of mature trees. However, unless sufficient care is taken and planning done in the interval between buying the property and completing construction, much of this resource is likely to be destroyed. The property owner is ultimately responsible for protecting as many trees as possible, with their understory and ground cover. This responsibility is usually exercised by agents - the planners, designers and contractors. It takes 20 to 30 years for newly planted trees to provide the benefits for which we value trees so highly. Trees perform the following functions on a site:

1. Assist in stabilizing the soil and preventing erosion.

2. Help to decrease stormwater runoff through canopy interception and root zone absorption.

3. Moderate temperature changes and provide shade.

4. Moderate the effects of sun and wind.

5. Provide buffers and screens against noise.

6. Filter pollutants from the air.

7. Help to remove carbon dioxide from the air and release oxygen.

8. Provide a haven for animals and birds, which help to control insect populations.

9. Conserve and increase property values.

10. Provide psychological and aesthetic counterpoints to the man-made urban setting.

Stresses of Construction -

Trees may appear to be inanimate objects, but they are living organisms that are constantly involved in the process of respiration, food processing, and growth. Construction activities expose trees to a variety of stresses resulting in injury ranging from superficial wounds to death. An understanding of these stresses is helpful in planning for tree protection.

1. Surface Impacts: Natural and man-related forces exerted on the tree above the ground can cause significant damage to trees.

    a. Wind damage - Removal of some trees from groups will expose those remaining to greater wind velocities. Trees tend to develop anchorage where it is most needed. Isolated trees develop anchorage rather equally all around, with stronger root development on the side of the prevailing winds. The more a tree is protected from the wind, the less secure is its anchorage. The result of improper thinning is often wind-thrown trees. Selective removal in favor of a single tall tree may also create a lightning hazard.

    b. Excessive pruning - Unprotected trees are often "topped" or carelessly pruned to prevent interference with utility wires or buildings. If too many branches are cut, the tree may not be able to sustain itself. If the pruning is done without considering the growth habit, the tree may lose all visual appeal. If the branches are not pruned correctly, decay may set in.

c. Trunk damage - Tree trunks are often nicked or scarred by trucks and construction equipment. Such superficial wounds provide access to insects and disease.

2. Root Zone Impacts: Disturbing and delicate relationship between soil, roots, and the rest of the tree can damage or kill a tree. The roots of an existing tree are established in an area where essential materials (water, oxygen, and nutrients) are present. The mass of the root system is the correct size to balance the intake of water from the soil with the transpiration of water from the leaves.

   a. Raising the grade as little as 150 millimeters (6 inches) can retard the normal exchange of air and gases. Roots may suffocate due to lack of oxygen, or be damaged by toxic gases and chemicals released by soil bacteria.

   b. Raising the grade may also elevate the water table. This can cause drowning of the deeper roots.

   c. Lowering the grade is not usually as damaging as raising it. However, even shallow cuts of 150 to 200 millimeters (6 to 8 inches) will remove most of the topsoil, removing some feeder roots and exposing the rest to drying and freezing.

   d. Deep cuts may sever a large portion of the root system, depriving the tree of water and increasing the chance of wind-throw.

   e. Lowering the grade may lower the water table, inducing drought. This is a problem in large roadway cuts or underdrain installations.

   f. Trenching or excavating through a tree's root zone can eliminate as much as 40 percent of the root system. Trees suffering such damage usually die within 2 to 5 years.

   g. Compaction of the soil within the drip line (even a few feet beyond the drip line) of a tree by equipment operation, materials storage, or paving can block off air and water from roots.

   h. Construction chemicals or refuse disposed of in the soil can change soil chemistry or be toxic to trees. Most damage to trees from construction activities is due to the invisible root zone stresses.

Design Criteria

No formal design is required. However, in planning for the development of a wooded site where some trees will be preserved, a number of criteria must be considered.

Selecting Trees to be Retained -

The proper development of a wooded site requires completion of a plan for tree preservation before clearing and construction begins. Trees should be identified by species, and located on a topographical map, either as stands or as individuals, depending on the density and value of the trees. Base decisions on which trees to save on the following considerations:

1. Life expectancy and present age: Preference should be given to trees with a long life span, such as white oak, beech, and maple. Long-lived specimens that are past their prime may succumb to the stresses of construction, so smaller, younger trees of desirable species are preferred; they are more resilient and will last longer. However, if the cost of preservation is greater than the cost of replacement with a specimen of the same age and size, replacement may be preferred.

2. Health and disease susceptibility: Check for scarring caused by fire or lightning, insect or disease damage, and rotted or broken trunks or limbs. Pest- and pollution-resistant trees are preferred.

3. Structure: Check for structural defects that indicate weakness or reduce the aesthetic value of a tree: trees growing from old stumps, large trees with overhanging limbs that endanger property, trees with brittle wood (such as silver maple), misshapen trunks or crowns, and small crowns at the top of tall trunks. Open grown trees often have better form than those grown in the woods. Trees with strong tap or fibrous root systems are preferred to trees with weak rooting habits.

4. Cleanliness: Some trees such as elm and black locust are notoriously "dirty", dropping twigs, bark, fruit, or plant exudates. A clean tree is worth more than a dirty one. Trees which seed prolifically or sucker profusely are generally less desirable in urban areas. Thornless varieties are preferred.

5. Aesthetic values: Handsome bark and leaves, neat growth habit, fine fall color, and attractive flowers and fruit are desirable characteristics. Trees that provide interest during several seasons of the year enhance the value of the site.

6. Comfort: Trees help relieve the heat of summer and buffer strong winds throughout the year. Summer temperatures may be 10 degrees cooler under hardwoods than under conifers. Deciduous trees drop their leaves in winter, allowing the sun to warm buildings and soil. Evergreens are more effective wind buffers.

7. Wildlife: Preference should be given to trees that provide food, cover, and nesting sites for birds and game.

8. Adaptability to the proposed development:

   a. Consider the mature height and spread of trees; they may interfere with proposed structures and overhead utilities. Roots may interfere with walls, walks, driveways, patios, and other paved surfaces; or water lines, septic tanks, and underground drainage.

   b. Trees must be appropriate to the proposed use of the development; select trees which are pollution-tolerant for high-traffic and industrial areas, screen and buffer trees for noise or objectionable views, salt-tolerant species for areas exposed to deicing salts or ocean spray.

   c. Consider location of landfills. Gases generated in them can travel long distances underground, to injure distant trees. Choose species tolerant of anaerobic soil conditions.

   d. Determine the effect of proposed grading on the water table. Grading should not take place within the drip line of any tree to be saved.

9. Survival needs of the tree: Chosen trees must have enough room to develop naturally. They will be subject to injury from increased exposure to sunlight, heat radiated from buildings and pavement, and wind. It is best to retain groups of trees rather than individuals. As trees mature, they can be thinned gradually.

10. Relationship to other trees: Individual species should be evaluated in relation to other species on the site. A species with low value when growing among hardwoods will increase in value if it is the only species present. Trees standing alone generally have higher landscape value than those in a wooded situation. However, tree groups are much more effective in preventing erosion and excess stormwater runoff.

Site Planning for Tree Protection -

1. If lot size allows, select trees to be saved before siting the building. No tree should be destroyed or altered until the design of buildings and utility systems is final.

2. Critical areas, such as flood plains, steep slopes, and wetlands, should be left in their natural condition or only partially developed as open space.

3. Locate roadways to cause the least damage to valuable stands. Follow original contours, where feasible, to minimize cuts and fills.

4. Minimize trenching by locating several utilities in the same trench. Excavations for basements and utilities should be kept away from the drip line of trees.

5. Construction material storage areas and worker parking should be noted on the site plan, and located where they will not cause compaction over roots.

6. When retaining existing trees in parking areas, leave enough ground ungraded beyond the drip line of the tree to allow for its survival.

7. Locate erosion and sediment control measures at the limits of clearing and not in wooded areas, to prevent deposition of sediment within the drip line of trees being preserved. Sediment basins should be constructed in the natural terrain, if possible, rather than in locations where extensive grading and tree removal will be required.

Specifications

1. Groups of trees and individual trees selected for retention shall be accurately located on the plan and designated as "tree(s) to be saved." Individual specimens that are not part of a tree group shall also have their species and diameter noted on the plan.

2. At a minimum, the limits of clearing shall be located outside the drip line of any tree to be retained and, in no case, closer than 1.5 meters (5 feet) to the trunk of any tree.

3. Marking: Prior to construction and before the preconstruction conference, individual trees and stands of trees to be retained within the limits of clearing shall be marked at a height visible to equipment operators. A diagonal slash

of brightly colored paint approximately 200 to 250 millimeters (8 to 10 inches) in length is a common practice in areas where an accidental or purposeful alteration of the proper markings is a concern. In most situations, such as an area which is supposed to receive formal landscaping, a surveyor's ribbon or a similar material applied at a reasonable height encircling the tree will suffice.

4. Pre-Construction Conference: During any preconstruction conference, tree preservation and protection measures should be reviewed with the contractor as they apply to that specific project.

5. Equipment Operation and Storage: Heavy equipment, vehicular traffic, or stockpiles of any construction materials (including topsoil) shall not be permitted within the drip line of any tree to be retained. Trees being removed shall not be felled, pushed or pulled into trees being retained. Equipment operators shall not clean any part of their equipment by slamming it against the trunks of trees to be retained.

6. Fires: Fires shall not be permitted within 30 meters (100 feet) from the drip line of any trees to be retained. Fires shall be limited in size to prevent adverse effects on trees, and kept under surveillance.

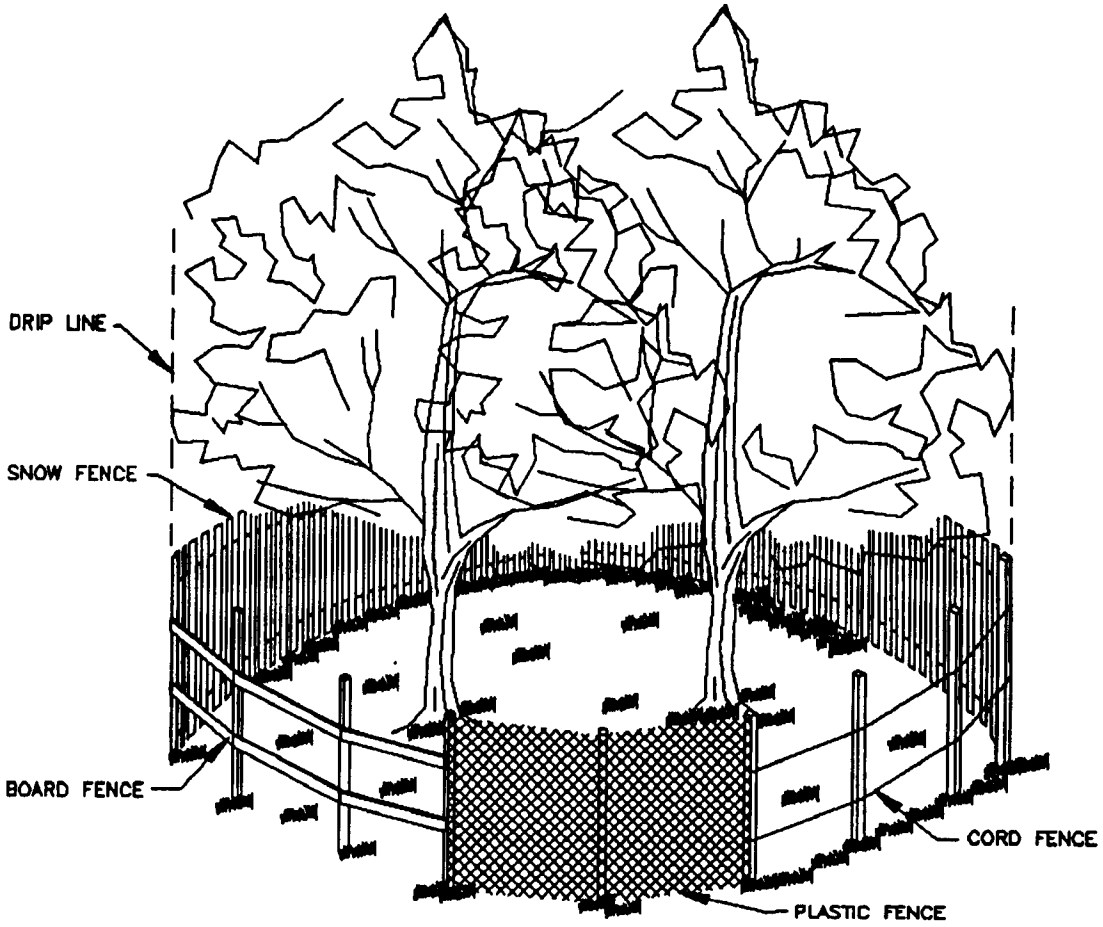
7. Storage and Disposal of Toxic Materials: No toxic materials shall be stored closer than 30 meters (100 feet) to the drip line of any trees to be retained. Paint, acid, nails, gypsum board, wire, chemicals, fuels, and lubricants shall not be disposed of in such a way as to injure vegetation.

8. Fencing and Armoring (See Figure 38-1): Any device may be used which will effectively protect the roots, trunk and tops of trees retained on the site. However, trees to be retained within 12 meters (40 feet) of a proposed building or excavation shall be protected by fencing. Personnel must be instructed to honor protective devices. The devices described are suggested only, and are not intended to exclude the use of other devices which will protect the trees to be retained.

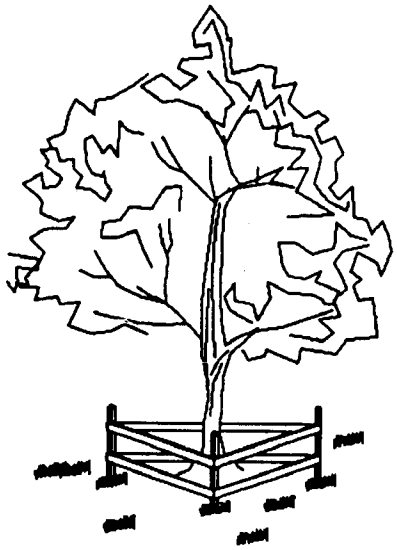
    a. Snow Fence - Standard 1 meter (40-inch) high snow fence shall be placed at the limits of clearing on standard steel posts set 2 meters (6 feet) apart.

    b. Board Fence - Board fencing consisting of 100 millimeter (4-inch) square posts set securely in the ground and protruding at least 1 meter (4 feet) above the ground shall be placed at the limits of clearing with a minimum of two horizontal boards between posts. If it is not practical to erect a fence at the drip line, construct a triangular fence

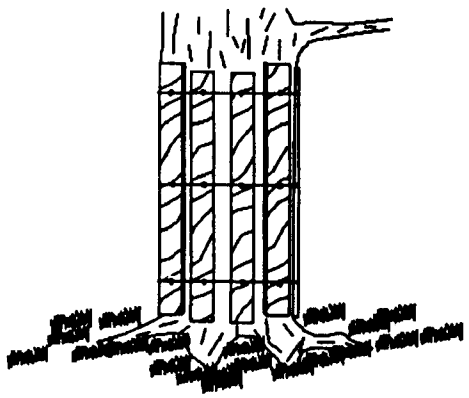
## FIGURE 38-1: FENCING AND ARMORING




CORRECT METHODS OF TREE FENCING



TRIANGULAR BOARD FENCE



CORRECT TRUNK ARMORING

nearer the trunk. The limits of clearing will still be located at the drip line, since the root zone within the drip line will still require protection.

c. Posts with a minimum size of 50 millimeters (2 inches) square or 50 millimeters in diameter set securely in the ground and protruding at least 1 meter (4 feet) above the ground shall be placed at the limits of clearing with two rows of cord 6 millimeters (0.25 inches) or thicker at least 600 millimeters (2 feet) apart running between posts with strips of colored surveyor's flagging tied securely to the string at intervals no greater than 1 meter (3 feet).

d. Plastic Fencing - 1,000 millimeters (40 inches) high "international orange" plastic (polyethylene) web fencing secured to conventional metal "T" or "U" posts driven to a minimum depth of 450 millimeters (18 inches) on 2 meter (6-foot) minimum centers shall be installed at the limits of clearing. The fence should have the following minimum physical qualities:

| | |
|---|---|
| Tensile yield: | Average 745 kilograms per meter width (2,000 pounds per 4-foot width) |
| Ultimate tensile yield: | Average 1,080 kilograms per meter width (2,900 lbs. per 4-foot width) |
| Elongation at break (%): | Greater than 1000% |
| Chemical resistance: | Inert to most chemicals and acids |

e. Earth Berms - Temporary earth berms shall be constructed according to specifications for a TEMPORARY DIVERSION DIKE (BMP-9) with the base of the berm on the tree side located along the limits of clearing. Earth berms may not be used for this purpose if their presence will conflict with drainage patterns.

f. Additional Trees - Additional trees may be left standing as protection between the trunks of the trees to be retained and the limits of clearing. However, in order for this alternative to be used, the trunks of the trees in the buffer must be no more than 2 meters (6 feet) apart to prevent passage of equipment and material through the buffer. These additional trees shall be reexamined prior to the completion of construction and either be given sufficient treatment to ensure survival or be removed.

g. Trunk Armoring - As a last resort, a tree trunk can be armored with burlap wrapping and 50 millimeter (2-inch) studs wired vertically no more than 50 millimeters apart to a height of 1.5 meters (5 feet) encircling the trunk. If this alternative is used, the root zone within the drip line will still require protection. Nothing should ever be nailed to a tree.

Fencing and armoring devices shall be in place before any excavation or grading is begun, shall be kept in good repair for the duration of construction activities, and shall be the last items removed during the final cleanup after the completion of the project.

9. Raising the grade: When the ground level must be raised around an existing tree or tree group, the following considerations shall be made and steps taken to adequately care for the affected tree.

a. A well may be created around the tree(s) slightly beyond the drip line to retain the natural soil in the area of the feeder roots.

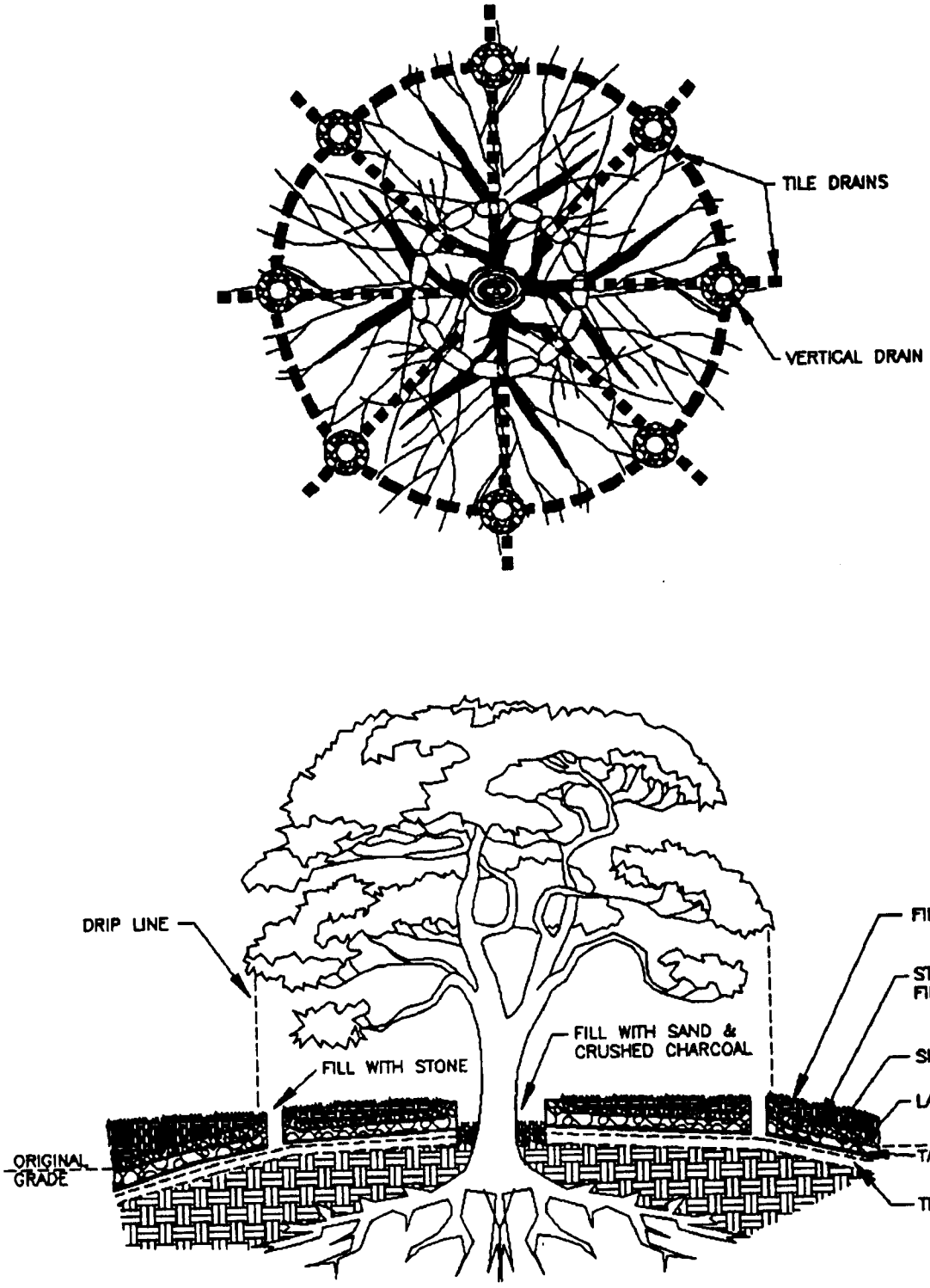
b. In the case of an individual tree, when the above alternative is not practical or desirable, the following method is recommended to ensure survival of the tree (See Figure 38-2).

1) Before making the fill, remove the green vegetation, sod, leaf litter, and other organic matter from beneath the tree or trees to a distance of 1 meter (3 feet) beyond the drip line and loosen the surface soil to a depth of approximately 75 millimeters (3 inches) without damaging the roots.

2) Apply fertilizer in the root area of the tree to be retained. Fertilizer formulations and application rates and methods shall conform to the guidelines provided in Table 38-1.

3) The dry well shall be constructed so as to allow for tree trunk diameter growth. A space of at least 0.3 meters (1 foot) between the tree trunk and the well wall is adequate for large, old, slow-growing trees. Clearance for younger trees shall be at least 0.6 meters (2 feet).

# FIGURE 38-2: TREE WELL DETAIL



# TABLE 38-1
# TREE FERTILIZATION FOR PROTECTION FROM CONSTRUCTION ACTIVITY

| Tree Type | Special Conditions | Application Rate & Method | | Formulation |
|---|---|---|---|---|
| Broad-Leaf Deciduous | Greater than 150 millimeters (6 inches) dbh* except American Beeches and Crabapples | Normal | 36-70 grams per mm (2-4 lbs/in) dbh; broadcast | Commercial 10-8-6 or 10-6-4 |
| | | Grade Change | 70-90 grams per mm (4-5 lbs/in) dbh; broadcast | Commercial 10-6-4 |
| | Smaller than 150 millimeters (6 inches) dbh, including all American Beeches and Crabapples | Normal | 18-36 grams per mm (1-2 lbs/in) dbh; broadcast | Commercial 10-8-6 or 10-6-4 |
| | | Grade Change | 36-54 grams per mm (2-3 lbs/in) dbh; broadcast | Commercial 10-6-4 |
| Narrow-Leaf Evergreen | Greater than 150 millimeters (6 inches) dbh, located groups | 10-20 kilograms per 100 square meters (2-4 lbs per 100 square feet) of bed area; broadcast | | Commercial 10-6-4 |
| | Greater than 150 millimeters (6 inches) dbh, single specimens in open area | 36 grams per mm (2 lbs/in) dbh; broadcast | | Commercial 10-6-4 |
| | Smaller than 150 millimeters (6 inches) dbh | 25 kilograms per 100 square meters (5 lbs per 100 square feet) of bed area; incorporated into soil | | Tankage or Cottonseed Meal |
| Broad-Leaf Evergreen | Where nitrogen in soil is sufficient | Liberal quantities incorporated into soil and applied as mulch | | Acid Peat Moss or Rotted Oak Leaf Mold |
| | Where additional nitrogen is necessary | Also add 25 kilograms per 100 square meters (5 lbs per 100 square feet) of bed area incorporated into soil | | Tankage or Cottonseed Meal |

*dbh = Diameter at breast height 1.4 meters (4.5) feet above ground level

4) The well shall be high enough to bring the top just above the level of the proposed fill. The well wall shall taper slightly away from the tree trunk at a rate of 80 millimeters per meter of wall height (1 inch per foot of wall height).

5) The well wall shall be constructed of large stones, brick, building tile, concrete blocks, or cinder blocks with care being taken to ensure that ample openings are left through the wall of the well to allow for free movement of air and water. Mortar shall only be used near the top of the well and only above the porous fill.

6) Drain lines composed of 100 millimeter (4-inch), high-quality drain tiles shall begin at the lowest point inside the well and extend outward from the tree trunk in a wheel-and-spoke pattern with the trunk as the hub. These radial drain lines shall slope away from the well at a rate of 10 millimeters per meter (0.125 inches per foot). The circumferential line of tiles should be located beneath the drip line of the tree. Vertical tiles or pipes shall be placed over the intersections of the two tile systems if a fill of more than 600 millimeters (2 feet) is contemplated. These vertical tiles shall be held in place with stone fill. Tile joints shall be tight. A few radial tiles shall extend beyond each intersection and shall slope sharply downward to ensure good drainage.

7) Tar paper or its approved equivalent shall be placed over the tile and/or pipe joints to prevent clogging, and large stone shall be placed around and over drain tiles and/or pipes for protection.

8) A layer of 50 to 150 millimeters (2 to 6 inches) of stone shall be placed over the entire area under the tree from the well outward at least as far as the drip line. For fills up to 600 millimeters (2-feet) deep, a layer of stone 200 to 300 millimeters (8 to 12 inches) thick should be adequate. A thicker layer of this stone, not to exceed 760 millimeters (30 inches), will be needed for deeper fills.

9) A layer of 20 to 25 millimeters (0.75 to 1-inch) stone covered by straw, fiber-glass mat or a manufactured filter fabric shall be used to prevent soil from clogging the space between stones. Cinders shall not be used as fill material.

10) Filling shall be completed with porous soil such as topsoil until the desired grade is reached. This soil shall be suitable to sustain specified vegetation.

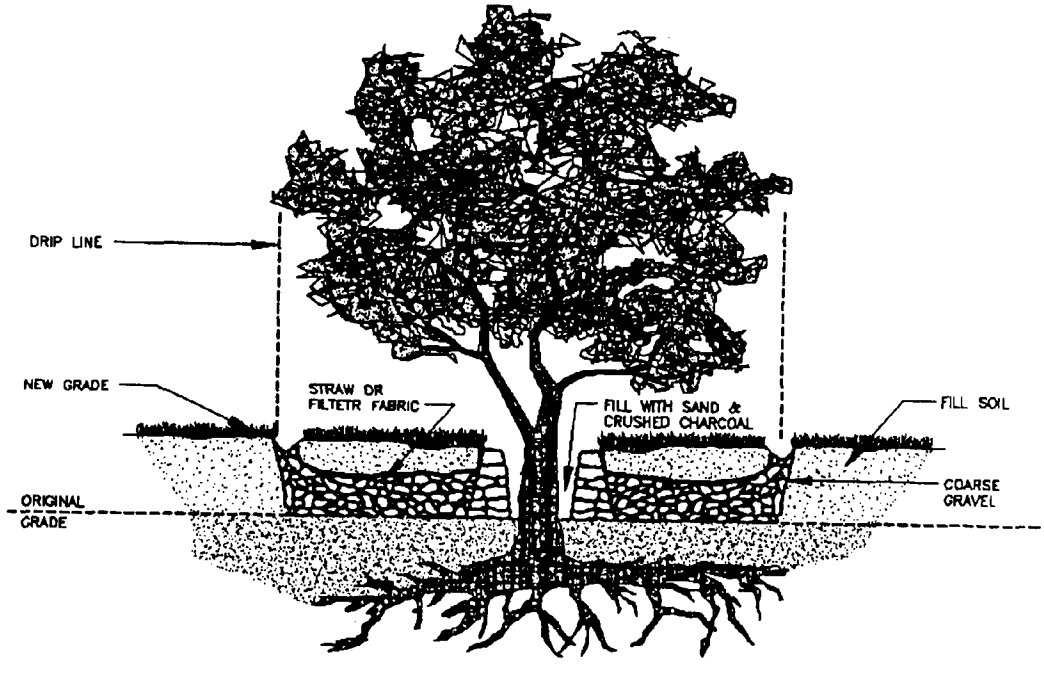
11) To prevent clogging of the drain lines, crushed stone shall be placed inside the dry well over the openings of the radial tiles. Vertical tiles shall also be filled with crushed rock and may also be covered with a screen.

12) To prevent anyone from falling into the dry well and leaves and debris from accumulating there, the area between the trunk and the well wall shall either be covered by an iron grate or filled with a 50-50 mixture of crushed charcoal and sand. (This will also prevent rodent infestation and mosquito breeding).

c. Where water drainage through the soil is not a problem, coarse gravel in the fill may be substituted for the tile. This material has sufficient porosity to ensure air drainage. Instead of the vertical tiles or pipes in the system, stones, crushed rock, and gravel may be added so that the upper level of these porous materials slants toward the surface in the vicinity below the drip line (see Figure 38-3).

d. Raising the grade on only one side of a tree or group of trees may be accomplished by constructing only half of one of these systems.

## FIGURE 38-3: TREE WELL WITHOUT DRAIN TILES



10. Lowering the grade: Trees shall be protected from harmful grade cuts by the construction of a tree wall (See Figure 38-4).

    a. Following excavation, all tree roots that are exposed and/or damaged shall be trimmed cleanly, painted with tree paint, and covered with moist peat moss, burlap, or other suitable material to keep them from drying out.

    b. The wall shall be constructed of large stones, brick, building tile, or concrete block or cinder block in accordance with the detail in Figure 38-4.

    c. Backfill with peat moss or other organic material or with topsoil to retain moisture and aid in root development.

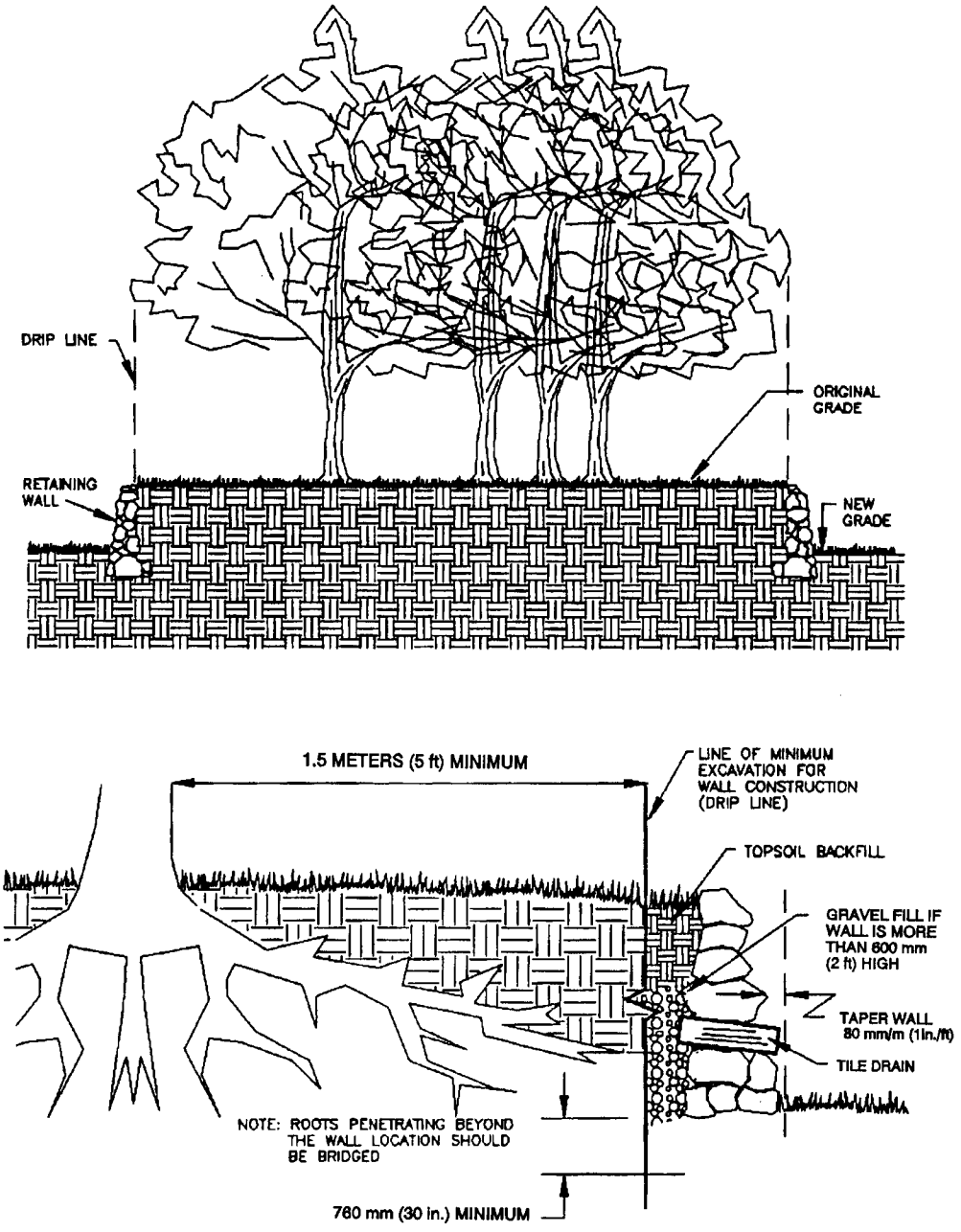
    d. Apply fertilizer and water thoroughly. Fertilizer formulations and application rates and methods shall conform to the guidelines provided in Table 38-1.

    e. Prune the tree crown, reducing the leaf surface in proportion to the amount of root loss.

    f. Provide drainage through the wall so water will not accumulate behind the wall.

    g. Lowering the grade on only one side of a tree or group of trees may be accomplished by constructing only half of this system.

# FIGURE 38-4: TREE WALL DETAIL



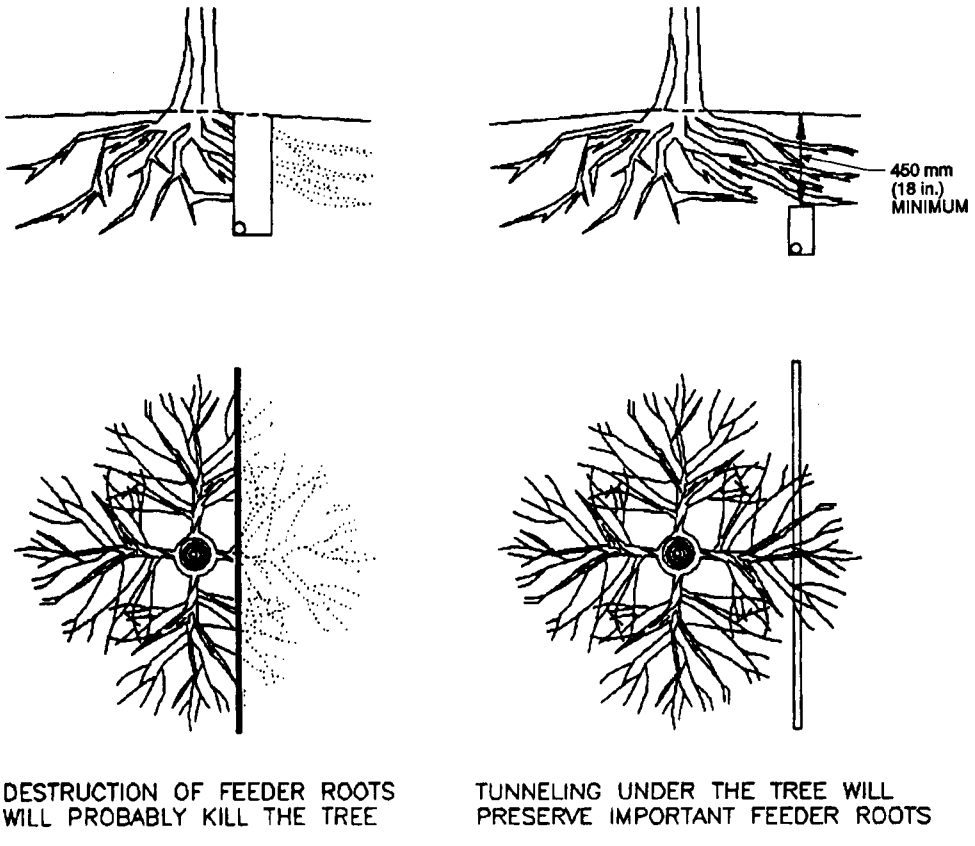
11. Trenching and Tunnelling:

a. Trenching shall be done as far away from the trunks of trees as possible, preferably outside the branches or crown spreads of trees, to reduce the amount of root area damaged, or killed by trenching activities.

b. Wherever possible, trenches should avoid large roots or root concentrations. This can be accomplished by curving the trench or by tunnelling under large roots and areas of heavy root concentration.

c. Tunnelling is more expensive initially, but it usually causes less soil disturbance and physiological impact on the root system (Figure 38-5). The extra cost may offset the potential cost of tree removal and replacement should the tree die.

**FIGURE 38-5: TRENCHING VS. TUNNELING**



Tunnelling is almost always preferred over the trenching method. The tunnel should be 450 millimeters (18 inches) or greater below the ground surface and should not be located under the center of the tree (an off-center tunnel has the least impact on the roots).

d. Roots shall not be left exposed to the air. They shall be covered with soil as soon as possible or protected and kept moistened with wet burlap or peat moss until the trench or tunnel can be filled.

e. The ends of damaged and cut roots shall be cut off smoothly and protected by painting promptly with a tree-wound dressing.

f. Trenches and tunnels shall be filled as soon as possible. Air spaces in the soil shall be avoided by careful filling and tamping.

g. Peat moss or other suitable material shall be added to the fill material as an aid to inducing and developing new root growth.

h. The tree shall be mulched and fertilized to conserve moisture, stimulate new root growth, and enhance general tree vigor.

i. If a large amount of the root system has been damaged and killed, the crown leaf surface shall be proportionately reduced to balance the reduced root system. This may be accomplished by pruning 20 to 30 percent of the crown foliage. If roots are cut during the winter, pruning shall be accomplished before the next growing season. If roots are cut during the growing season, pruning shall be done immediately.

12. Removal and Replacement of Damaged Trees: Should a tree intended and marked to be retained be damaged seriously enough that survival and normal growth are not possible, the tree shall be removed. If replacement is desirable and/or required, the replacement tree shall be of the same or similar species, 50 to 60 millimeter (2 to 2.5 inches) (minimum) caliper balled and burlapped nursery stock. However, today, with the aid of a "tree spade," the same caliper tree may be required as a replacement.

13. Clean-Up: Clean-up after a construction project can be a critical time for tree damage. Trees protected throughout the development operation are often destroyed by carelessness during the final clean-up and landscaping. Fences and barriers shall be removed last, after everything else is cleaned-up and carried away.

14. Maintenance: In spite of precautions, some damage to protected trees may occur. In such cases, the following maintenance guidelines should be followed:

a. Soil Aeration - If the soil has become compacted over the root zone of any tree, the ground shall be aerated by punching holes with an iron bar. The bar shall be driven 300 millimeters (1-foot) deep and then moved back and forth until the soil is loosened. This procedure shall be repeated every 450 millimeters (18 inches) until all of the compacted soil beneath the crown of the tree has been loosened.

b. Repair of Damage

1) Any damage to the crown, trunk, or root system of any tree retained on the site shall be repaired immediately.

2) Whenever major root or bark damage occurs, remove some foliage to reduce the demand for water and nutrients.

3) Damaged roots shall immediately be cut off cleanly inside the exposed or damaged area. Cut surfaces shall be painted with approved tree paint, and moist peat moss, burlap, or top-soil shall be spread over the exposed area.

4) To treat bark damage, carefully cut away all loosened bark back into the undamaged area, taper the cut at the top and bottom, and provide drainage at the base of the wound.

5) All tree limbs damaged during construction or removed for any other reason shall be cut off above the collar at the preceding branch junction.

6) Care for serious injuries shall be prescribed by a forester or a tree specialist.

c. Fertilization: Broadleaf trees that have been stressed or damaged shall receive a heavy application of fertilizer to aid their recovery.

1) Trees shall be fertilized in the late fall (after October 1) or the early spring (from the time frost is out of the ground until May 1). Fall applications are preferred, as the nutrients will be made available over a longer period of time.

2) Fertilizer shall be applied to the soil over the feeder roots. In no case should it be applied closer than 1 meter (3 feet) to the trunk.

   The root system of conifers extends some distance beyond the drip line. Increase the area to be fertilized by one fourth the area of the crown.

3) Fertilizer shall be applied using approved fertilization methods and equipment.

4) Formulations and application rates shall conform to the guidelines given in Table 38-1.

Maintain ground cover of organic mulch around trees that is adequate to prevent erosion, protect roots, and hold water.